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(54) Title: ANTIMICROBIAL LUBRICANT FOR WOOD FIBER-PLASTIC COMPOSITES

(57) Abstract: The invention relates to a polymer-cellulosic fiber composition comprising a polymer, a cellulosic fiber, and a quaternary ammonium alkyl salt wherein the latter imparts antimicrobial properties to the composition and functions as a lubricant during the formation of the composition. The quaternary ammonium alkyl salts may be alkyl carboxylate, alkyl sulfate, alkyl sulphonate, alkyl phosphate, or alkyl phosphite. Certain of the salts are new compositions of matter. The method of extruding and the extrudate are also claimed.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/27059

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C 08 K 13/00, 5/42, 5/19

US CL : (see Section B)

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : (see Electronic Databases Searched, below)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Continuation Sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP2-120342 A (IWASAKI et al.) 8 May 1988 (08.05.1988).	
Y	JP 2-120342 A (IWASAKI et al.) 8 May 1988 (08.05.1988), USPTO translation, pages 2-4, penultimate paragraph of page 5, examples II and V.	1-25
Y	GB 1014539 (JOLLES et al.) 31 December 1965 (31.12.1965), page 1, lines 44-82; page 2, lines 1-15 and 27-45; examples 15,16,22,23.	1-25
A ✓	US 5970916 A (YODER et al.) 26 October 1999 (26.10.1999).	1
A ✓	US 5206325 A (HATA et al.) 27 April 1993 (27.04.1993).	1
Y ✓	US 5288775 A (BISCHOFF et al.) 22 February 1994 (22.02.1994), claims.	1-25
Y ✓	US 5130352 A (CHOW) 14 July 1992 (14.07.1992), claims.	1-25
Y ✓	US 4833181 (NARUKAWA et al.) 23 May 1989 (23.05.1989), example 18, claims.	1-25
Y ✓	US 4680328 (DOHRER et al.) 14 July 1987 (14.07.1987), column 5, lines 5-18; claims.	1-25

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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## INTERNATIONAL SEARCH REPORT

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## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y ✓	US 4480061 (COUGHLIN et al.) 30 October 1984 (30.10.1984), claims.	1-25
Y	STN AN:1974:478633 "Synthesis and study of tetrasubstituted ammonium salts as antistatics for plastics IV" (VASILENOK et al.), Vestsi Akademii Navuk BSSR, Seryya Khimichnykh Navuk (1974), entered STN 12 May 1984, see abstract.	1-25
Y ✓	"Synthesis and study of tetrasubstituted ammonium salts as antistatics for plastics IV" (VASILENOK et al.), Vesti Akademii Navuk BSSR, Seryya Khimichnykh Navuk (1974) No. 2, pp 66-69, Russian language.	1-25

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/27059

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.: 1-25, carboxylate and sulfate species only.
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐  
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-25, drawn to formulations comprising quaternary ammonium salt with an acid selected from the group of alkylcarboxylic, alkylsulfuric, alkylsulphonic, alkylphosphoric, and alkylphosphorous, plus polymer, plus cellulosic fiber, and methods of making same.

Group II, claim(s) 26, drawn to quaternary ammonium salt with an acid selected from the group of alkylsulphonic, alkylphosphoric, and alkylphosphorous.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The common technical feature is the quaternary ammonium cation and an anionic oxygen. Such appears to be admitted known by others with respect to acids selected from the group of alkylcarboxylic and alkylsulfuric (paragraph bridging pages 3-4). Such may be found in Hata et al. (US 5206325) which discloses and exemplifies dimethyldistearylammonium stearate (examples 8-14). Since the common technical feature is not novel, it cannot be considered a special technical feature.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

Group I contains 5 species consisting of quaternary ammonium salt with an acid selected from the group of alkylcarboxylic, alkylsulfuric, alkylsulphonic, alkylphosphoric, and alkylphosphorous.

Group II contains 3 species consisting of quaternary ammonium salt with an acid selected from the group of alkylsulphonic, alkylphosphoric, and alkylphosphorous.

The claims are deemed to correspond to the species listed above in the following manner:

**Group I:**

alkylcarboxylic: none;  
alkylsulfuric: claims 5-7, 16-18, 23, and 24;  
alkylsulphonic: none;  
Alkylphosphoric: none;  
Alkylphosphorous: none.

The following claim(s) are generic: 1-4, 8-15, 19-22, 25.

**Group II:**

alkylsulphonic: none;  
Alkylphosphoric: none;  
Alkylphosphorous: none.

The following claim(s) are generic: 26

## INTERNATIONAL SEARCH REPORT

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: The common technical feature is the quaternary ammonium cation and an anionic oxygen. Such appears to be admitted known by others with respect to acids selected from the group of alkylcarboxylic and alkylsulfuric (paragraph bridging pages 3-4). Such may be found in Hata et al. (US 5206325) which discloses and exemplifies dimethyldistearylammonium stearate (examples 8-14). Since the common technical feature is not novel, it cannot be considered a special technical feature.

**Continuation of B. FIELDS SEARCHED Item 3:**

USPAT, USOCR: (523/122, 524/13,15).ccls. and ammonium and cellulose\$2

USPAT: (523/122).ccls. and polyethylene SAME (wood or cellulose\$2)

EPO,JPO,DERWENT,IBM-TDB: (polymer\$2 or resin\$1) and ammonium and cellulose\$2 and (mixture or composite or composition) and (fiber or fibrous)